JHR 97: 1417–1433 (2024)
doi: 10.3897/jhr.97.139623
https://jhr.pensoft.net

RESEARCH ARTICLE

JOURNAL OF Hymenoptera RESEARCH
A peer-reviewed open-access journal
The International Society of Hymenopterists

A new species and new records of *Hoplitis* Klug (Hymenoptera, Megachilidae) from Russia

Alexander V. Fateryga[1], Maxim Yu. Proshchalykin[2,3], Evgeny V. Abakumov[4]

1 *T.I. Vyazemsky Karadag Scientific Station, Nature Reserve of RAS, Branch of A.O. Kovalevsky Institute of Biology of the Southern Seas of RAS, Nauki Str. 24, Kurortnoye, 298188 Feodosiya, Russia* **2** *Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch of the Russian Academy of Sciences, 100-let Vladivostoku Ave. 159, 690022 Vladivostok, Russia* **3** *Tomsk State University, Lenin Ave. 36, 634050 Tomsk, Russia* **4** *Department of Applied Ecology, Saint-Petersburg State University, Universitetskaya Emb. 7–9, 199034 Saint-Petersburg, Russia*

Corresponding author: Alexander V. Fateryga (fater_84@list.ru)

Academic editor: Michael Ohl | Received 18 October 2024 | Accepted 30 November 2024 | Published 20 December 2024

https://zoobank.org/3B4F61BA-8D5D-41C0-BAD7-E748C82C503F

Citation: Fateryga AV, Proshchalykin MYu, Abakumov EV (2024) A new species and new records of *Hoplitis* Klug (Hymenoptera, Megachilidae) from Russia. Journal of Hymenoptera Research 97: 1417–1433. https://doi.org/10.3897/jhr.97.139623

Abstract

Hoplitis (*Hoplitis*) *andreasmuelleri* **sp. nov.**, a member of the *H. adunca* species group, is described from the vicinity of Kurush (Samurskiy National Park, Dagestan, Russia). The new species is closely related to *H. dagestanica* Fateryga, Müller & Proshchalykin, 2023. Females of *H. andreasmuelleri* can be easily distinguished from those of *H. dagestanica* by a black antenna, a small impunctate triangular area at the base of the clypeus, ferruginous tarsi, sparse and often interrupted apical band of hairs on terga 1–5, and a whitish scopa. Males of *H. andreasmuelleri* can be easily distinguished from those of *H. dagestanica* by a black antenna, the last antennal article not tapering towards the apex, antennal articles 5–12 not modified, ferruginous tarsi, and the lateral lobes of the bilobed membranous appendage at the apical margin of sternum 6 laterally elongated into a rounded tip and medially not separated from each other by an emargination. Females of *H. andreasmuelleri* were recorded at flowers of two species of the genus *Vicia* L. (Fabaceae). *Hoplitis* (*Kumobia*) *abbreviata* (Morawitz, 1875) is reported from Russia (Altai Republic) for the first time. New distributional records are reported for *H.* (*Alcidamea*) *fulva* (Eversmann, 1852) and *H.* (*Anthocopa*) *perezi* (Ferton, 1894). *Hoplitis* (*Anthocopa*) *papaveris* (Latreille, 1799) is excluded from the fauna of Crimea and the south of European Russia from where it was previously reported based on a misidentification of *H. perezi*. The biology of *H. perezi* in Crimea is briefly discussed. An updated distributional list of all 39 species of *Hoplitis* known from Russia is provided.

Keywords

Altai, Caucasus, Crimea, megachilid bees, osmiine bees, Palaearctic region, taxonomy

Copyright *Alexander V. Fateryga et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

With 391 species described so far, *Hoplitis* Klug is the largest genus of osmiine bees (Hymenoptera, Megachilidae, Osmiini) (Müller 2024). The genus is distributed in the Palaearctic, Nearctic, and Afrotropical regions; a few species also occur in the Oriental region (Michener 2007). The genus *Hoplitis* is especially diverse in the Palaearctic region, where 14 subgenera and 315 species occur (Praz et al. 2008; Ungricht et al. 2008; Sedivy et al. 2012a; Müller 2024). At least 64 Palaearctic species are still undescribed, of which at least 50 species belong to the largest subgenus *Hoplitis* (*Hoplitis*) (Aubert et al. 2024; Müller 2024). This subgenus comprises several species groups, the largest of which is the *H. adunca* species group, one of the taxonomically most challenging osmiine bee taxa due to the high morphological uniformity among its species, especially in the female sex (Müller 2016, 2024). The nesting biology of *Hoplitis* is extremely diverse and encompasses the whole diversity observed across the osmiine bees (Müller 2024).

Twenty-eight species of *Hoplitis* were reported from Russia in the "Annotated catalogue of the Hymenoptera of Russia" (Proshchalykin and Fateryga 2017). Subsequently published updates excluded five of them and added 14 other species (Fateryga et al. 2019, 2023; Proshchalykin and Müller 2019; Fateryga and Proshchalykin 2020, 2024; Fateryga and Ivanov 2023; Proshchalykin et al. 2023), including two new species of *Hoplitis* (*Hoplitis*) (Fateryga et al. 2023). The purpose of the present contribution is to report new data on the genus *Hoplitis* from Russia. One species is described as new to science and one species is reported from Russia for the first time; new distributional records of two other species are also reported.

Material and methods

The acronyms for the institutions where the studied specimens are deposited are as follows:

CAFK Research collection of A.V. Fateryga, Feodosiya, Russia;
CFUS V.I. Vernadsky Crimean Federal University, Simferopol, Russia;
ETHZ Entomological Collection of ETH Zurich, Switzerland;
FSCV Federal Scientific Center of the East Asia Terrestrial Biodiversity of the Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia;
ZISP Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

Morphological terminology and definitions for body measurements follow Michener (2007) with the following specifications: i) the distance between lateral ocellus and preoccipital margin was measured in top view rather than in lateral view; ii) the diameter of an ocellus includes the ocellar border, which is often of the same color as the surrounding cuticle thereby differing from the usually light color of the central part of the ocellus; iii) the length of a segment of the labial palpus was measured from its sclerotized base to the sclerotized base of the subsequent segment; iv) the length of an antennal article was measured along its ventral margin, while its width

corresponds to the maximal width of the article; v) numbering of antennal articles starts from the scapus, which is antennal article 1, and ends with the last flagellomere, which is antennal article 12 (females) or 13 (males). Measurements to the nearest 0.1 mm or 0.5 mm (for body length) were taken using an ocular micrometer of an MBS-9 stereomicroscope.

Photographs of the specimens were taken with a Canon EOS 550D digital camera and a Yongnuo YN-14EX macro flash attached to an Olympus SZX16 stereomicroscope, except the photographs of the habitus, which were taken with a Canon EOS RP digital camera with a Sigma AF 105 mm f/2.8 macro lens and a Yongnuo YN-14EX macro flash. The final illustrations were processed for sharpness, contrast, and brightness with Adobe Photoshop CS2 software.

The distribution of species in Russia is based on Proshchalykin and Fateryga (2017) and subsequently published updates (Byvaltsev and Proshchalykin 2019; Fateryga et al. 2019, 2023; Proshchalykin and Müller 2019; Fateryga and Proshchalykin 2020, 2024; Levchenko 2020, 2023; Fateryga and Ivanov 2023; Proshchalykin et al. 2023). The distribution outside Russia is based on Müller (2024). New distributional records (both national and provincial) are marked in the text with an asterisk (*).

Results and discussion

Hoplitis (*Alcidamea*) *fulva* (Eversmann, 1852)

Osmia fulva Eversmann, 1852: 63, ♂ (type locality: "in prov. Orenburg. australi, in prov. Saratov. et Astrachanensi, – et in terris transuralensibus" [Russia: Southern Urals and Lower Volga Region]), syntypes, ♂♂, Institute of Systematic and Experimental Zoology of the Polish Academy of Sciences, Krakow, Poland.

Osmia grandis Morawitz, 1872: 54, ♀♂ (type locality: "Sarepta" [Russia: Volgograd], according to the lectotype designation by Proshchalykin et al. 2017: 25), lectotype, ♂, ZISP. Synonymized by Ducke 1900: 202.

Material examined (new records). Russia. • Astrakhan Province: Ryn-Peski, 1 ♀ [ZISP]. • Volgograd Province: 18 km NNE Kalach-na-Donu, 10–13.VII.2015, 4 ♀, leg. M. Proshchalykin, V. Loktionov, M. Mokrousov, S. Belokobylskij [FSCV].

Distribution. Russia: European part (East, *South, Crimea), Urals. – Eastern Europe, Armenia, Azerbaijan, Turkey, Syria, Jordan, Kazakhstan, Mongolia, China.

Hoplitis (*Anthocopa*) *perezi* (Ferton, 1894)

Fig. 1

Osmia perezi Ferton, 1894: 207, ♀ (type locality: "Miramas" [France], according to the lectotype designation by Tkalců 1969: 330), lectotype, ♀, Muséum National d'Histoire Naturelle, Paris, France.

Osmia papaveris convolvuli Ducke, 1899: 214, ♀♂ (type locality: "Triest" [Italy], "Fiume" [Croatia], "Sicilien" [Italy], "Spanien" [Spain]), syntypes, ♀♀, ♂♂, Natural History Museum, Vienna, Austria and other collections not indicated. Synonymized by Tkalců 1969: 330.

Material examined (new records). Russia. • Astrakhan Province: 8 km SE Promyslovka, 45°40'23"N, 47°14'26"E, 21.V.2019, 1 ♀, leg. M. Proshchalykin, V. Loktionov [FSCV]. • Krasnodar Territory: Temryuk District, Taman Peninsula, vicinity of Priazovskiy, 25.VI.2012, 1 ♀, leg. I. Popov [CAFK]. • Crimea: Tarkhankut Peninsula, Kipchak Bay, 28.V.2004, 1 ♂, leg. S. Ivanov [CFUS]; • ibid., 23.VI.2007, 1 ♀, leg. A. Fateryga [CFUS]; • ibid., 27.VI.2007, 1 ♀, at nest, leg. A. Fateryga [CAFK]; • ibid., 1.VI.2012, 1 ♂, leg. V. Zhidkov [CFUS]; • ibid., 14.VI.2012, 1 ♂, leg. V. Zhidkov [CFUS]; • ibid., 12.VI.2013, 1 ♀, leg. V. Zhidkov [CFUS]; • ibid., 26–27.VI.2013, 1 ♀, leg. V. Zhidkov [CFUS]; • ibid., 14.VI.2014, 1 ♀, leg. V. Zhidkov [CFUS]; • Tarkhankut Peninsula, Bolshoy Kastel Bay, 31.V.2014, 1 ♀, leg. V. Zhidkov [CFUS]; • ibid., 31.V.2014, 1 ♂, leg. V. Zhidkov [CAFK]; • Adym-Chokrak Valley, 9.VII.2011, 1 ♂, leg. V. Zhidkov [CFUS]; • Yalta, 21.VI.1999, 1 ♂, leg. S. Ivanov [CFUS]; • ibid., 17.VII.2004, 1 ♀, leg. A. Fateryga [CFUS]; • Yalta, Seaport, 8.VI.2011, 1 ♂, on *Malva sylvestris*, 1 ♂, on *Convolvulus arvensis*, leg. A. Fateryga [CFUS]; • Yalta, Sovetskoye, 5.VI.2010, 1 ♀, 1 ♂, leg. S. Ivanov [CFUS]; • ibid., 6.VI.2010, 1 ♂, on *Echium vulgare*, leg. S. Ivanov [CFUS]; • Yalta Reserve, below Mt. Aypetri, 6.VI.2010, 2 ♂, leg. V. Zhidkov [CFUS]; • Mt. Demerdzhi, Angarskiy Pass, 15.VI.2002, 1 ♂, leg. S. Ivanov [CFUS]; • Kanaka Valley, 27–28.V.2000, 2 ♀, leg. S. Ivanov [CFUS]; • Karadag Reserve, 24.V.2000, 1 ♀, leg. Yu. Budashkin [CFUS]; • ibid., 20–21.VI.2004, 1 ♀, leg. Yu. Budashkin [CFUS]; • ibid., 15.VI.2008, 1 ♀, leg. V. Zhidkov [CFUS]; • Opuk Reserve, 1.VI.2002, 1 ♂, leg. S. Ivanov [CFUS].

Distribution. Russia: European part (*South, North Caucasus, *Crimea). – Western, Southern, and Eastern Europe, Northern Africa, Armenia, Azerbaijan, Turkey, Israel, Iran, Afghanistan, Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan.

Remarks. All previous reports of *Hoplitis papaveris* (Latreille, 1799) from Crimea (Fateryga et al. 2018 and references therein; Fateryga and Ivanov 2023), as well as the report from the south of European Russia (Fateryga and Proshchalykin 2020), were based on a misidentification of *H. perezi*. Therefore, *H. papaveris* should be excluded from the fauna of these regions. *Hoplitis perezi* is confined in Crimea to open landscapes with a steppe vegetation (Fig. 1A). Females nest in the ground, on horizontal surfaces. The nest hole and its entrance are lined with fragments of petals of *Convolvulus cantabrica* L. (Convolvulaceae) (Fig. 1C, D). Females use flowers of the same plant species as the source of pollen and nectar (Fig. 1B). Following nest construction, the female dismantles the entrance collar of petals and fills the nest entrance with earth. Females of *H. perezi* often use abandoned nest holes of other hymenopterans for nesting, e.g., burrows of *Tropidodynerus interruptus* (Brullé, 1832) (Hymenoptera:

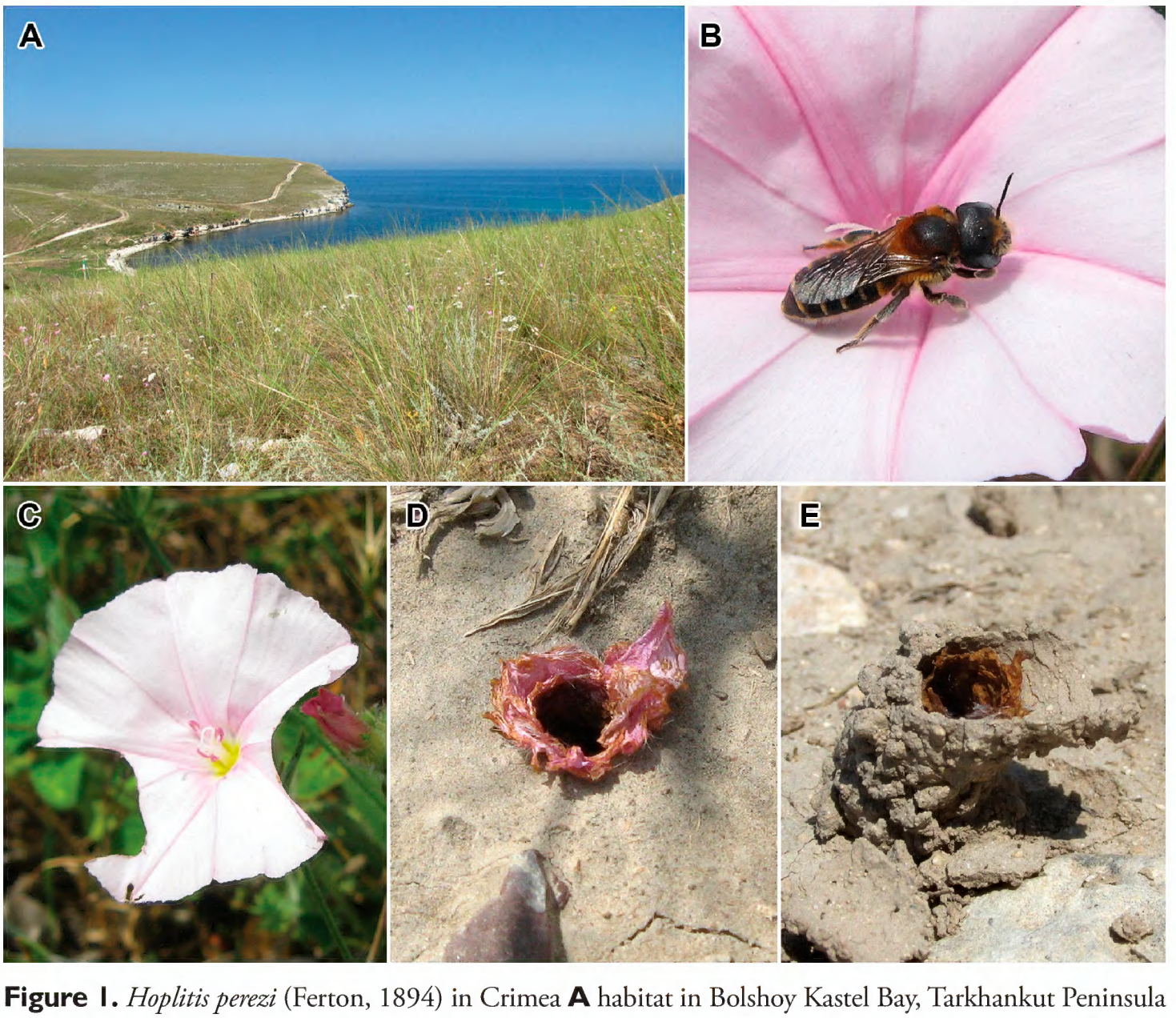

Figure 1. *Hoplitis perezi* (Ferton, 1894) in Crimea **A** habitat in Bolshoy Kastel Bay, Tarkhankut Peninsula **B** female on a flower of *Convolvulus cantabrica* L., Yalta **C** flower of *C. cantabrica* with cuts made by *H. perezi*, Yalta **D** entrance of a freshly constructed nest, Lisya Bay **E** old nest in the entrance turret of an abandoned nest of *Paragymnomerus signaticollis tauricus* (Kostylev, 1940), Bolshoy Kastel Bay, Tarkhankut Peninsula.

Vespidae) (Fateryga 2009, the bee reported as *H. papaveris*) or even entrance turrets of *Paragymnomerus signaticollis tauricus* (Kostylev, 1940) (Hymenoptera: Vespidae) (Fateryga 2018, the bee also reported as *H. papaveris*). In the latter case, the nest entrance of *H. perezi* can be situated aboveground (Fig. 1E). According to the previously published data on the biology of this species, mainly from France and Italy (Ferton 1894, 1895, 1897, 1901; Ducke 1899, 1900; Benoist 1931; Müller 2024), females of *H. perezi* excavate burrows in hard and generally horizontal soil (ca. 2–3 cm deep) and construct 1–3 linearly arranged cells entirely built of several layers of petals of *Convolvulus* spp., particularly *C. cantabrica*; petals are also used to build partitions between adjacent cells and to line the entrance burrow. Thus, we confirm the close relationship of *H. perezi* with flowers of *C. cantabrica* but cannot confirm that the nest burrow is excavated. At least in Crimea, this species is confirmed to use pre-existing burrows, at least in some cases.

***Hoplitis* (*Hoplitis*) *andreasmuelleri* Fateryga & Proshchalykin, sp. nov.**
https://zoobank.org/0CC62277-14AA-43E4-BEB5-C2C6F4F3EBB4
Figs 2, 3

Diagnosis. Among the western Palaearctic *Hoplitis* species of the subgenus *Hoplitis* s. str., the female of *H. andreasmuelleri* (Fig. 2A) is unequivocally characterised by the following combination of characters: i) sternum 6 lateroapically with distinct submarginal carina and medioapically elongated into a very short triangular tooth; ii) proboscis not reaching to trochanter of hind leg in repose and second segment of labial palpus distinctly shorter than maximal length of mesosoma measured in lateral view (Fig. 2A); iii) clypeus and galea of proboscis normally haired, without apically curved or wavy pollen-collecting bristles; iv) lateral lobes of pronotum not inflated; v) apex of inner tibial spur of hind leg strongly curved at an angle of 30 to 40 degrees, spur yellowish (Fig. 2C); vi) clypeus medially without uninterrupted sharp and narrow longitudinal carina, basally with a small impunctate triangular area (Fig. 2B); vii) disc of tergum 5 covered with moderately dense and appressed whitish pilosity (Fig. 2E); viii) when seen from behind, longest erect hairs on median half of tergum 1 only about 1/7 to 1/8 as long as maximal length of lateral hair tuft; ix) punctation of lateroapical part of scutum with interspaces reaching the diameter of one puncture; x) metasomal scopa whitish (Fig. 2A); xi) tarsi of all legs predominately ferruginous (Fig. 2A); xii) antenna completely black (Fig. 2B); xiii) marginal zone of terga 1–5 with sparse and often interrupted band of whitish hairs (Fig. 2D). The male of *H. andreasmuelleri* (Fig. 3A) is easily diagnosed by the following combination of characters: i) apical margin of tergum 7 medially rounded (Fig. 3D); ii) second segment of labial palpus longer than compound eye (Fig. 3A); iii) antenna black (Fig. 3B, C); iv) last article of antenna about 1.7× as long as basally wide (Fig. 3B); v) in dorsal view, posterior side of the last article of antenna strongly widened towards apex (Fig. 3C); vi) antennal article 3 about 1.3× as long as apically wide and longer than article 4 (Fig. 3B, C); vii) ventral margin of antennal articles 3–4 distinctly widened distally (Fig. 3B); viii) antennal articles 4–5 as wide as article 3 apically and in dorsal view wider than articles 6–12 (Fig. 3C); ix) lateral lobes of bilobed membranous appendage at apical margin of sternum 6 moderately haired, distinctly wider than long, laterally elongated into a distinct rounded tip and medially not separated from each other by an emargination (Fig. 3E); x) apical margin of the sclerotised base of sternum 6 with two very narrow and diverging median tufts of few long hairs, which surpass the centre of the membranous appendage of sternum 6; xi) marginal zone of sterna 4–5 reddish and very densely punctured with interspaces much narrower than the diameter of one puncture (Fig. 3E).

Differential diagnosis. Among other species of *Hoplitis* (*Hoplitis*) known from Dagestan, viz. *H.* (*H*). *adunca* (Panzer, 1798), *H.* (*H*). *anthocopoides* (Schenck, 1853), *H.* (*H*). *dagestanica* Fateryga, Müller & Proshchalykin, 2023, *H.* (*H*). *linguaria* (Morawitz, 1875), and *H.* (*H*). *manicata* Morice, 1901 from the *H. adunca* species group and *H.* (*H*). *astragali* Fateryga, Müller & Proshchalykin, 2023 from the *H. monstrabilis*

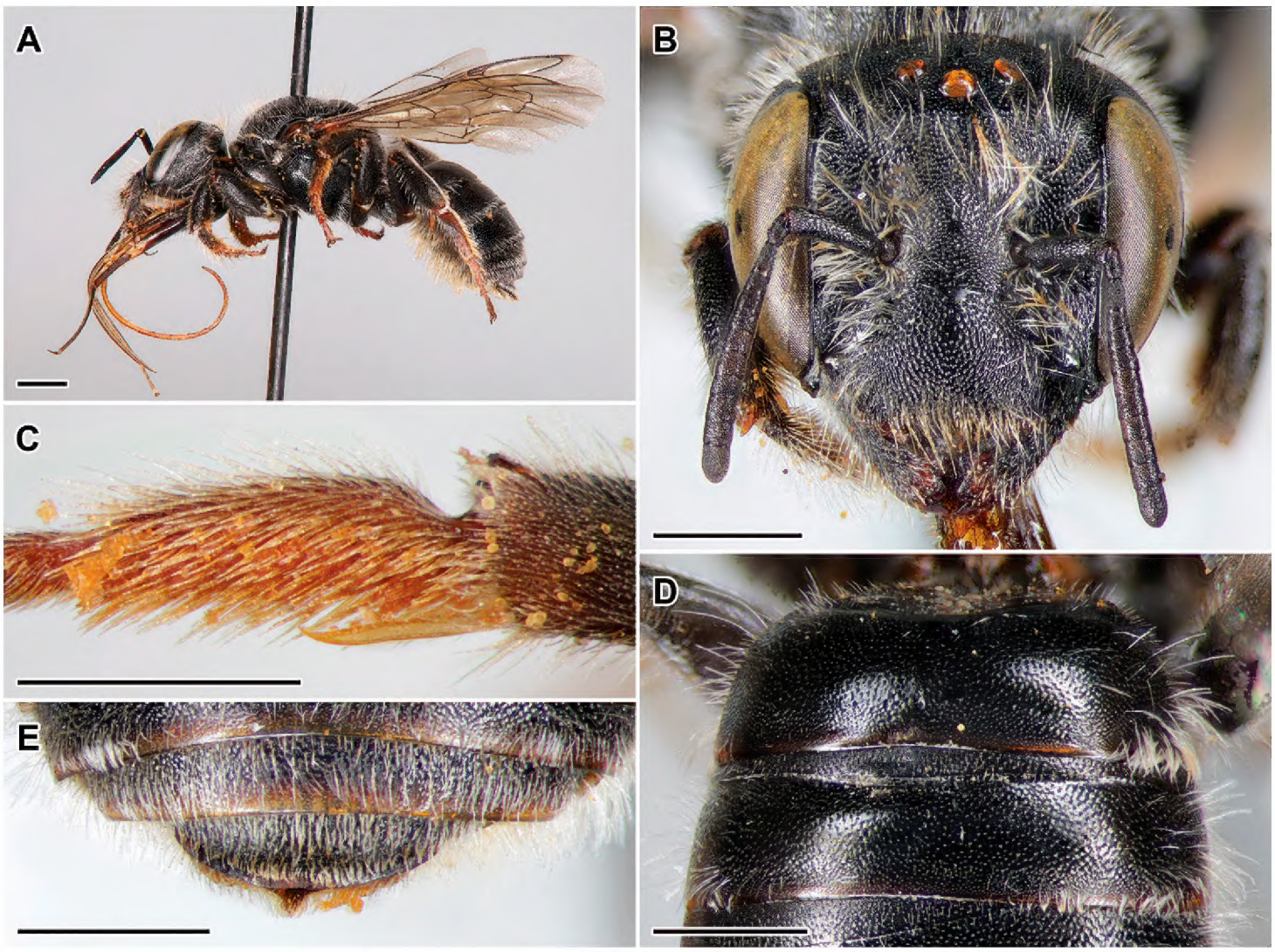

Figure 2. *Hoplitis andreasmuelleri* Fateryga & Proshchalykin, sp. nov., ♀, paratype **A** habitus in lateral view **B** head in front view **C** part of hind leg with inner tibial spur **D** terga 1–2 in dorsal view **E** terga 5–6 in dorsal view. Scale bars: 1 mm.

species group (Fateryga and Proshchalykin 2024), the new species is the most closely related to *H. dagestanica*. Females of *H. andreasmuelleri* can be easily distinguished from those of *H. dagestanica* by black antenna (flagellum partly dark reddish-brown anteriorly in *H. dagestanica*), a small impunctate triangular area at the base of clypeus (absent in *H. dagestanica*), ferruginous tarsi (brown in *H. dagestanica*), sparse and often interrupted apical band of hairs on terga 1–5 (denser uninterrupted band in *H. dagestanica*), and whitish scopa (yellowish in *H. dagestanica*). Males of *H. andreasmuelleri* can be easily distinguished from those of *H. dagestanica* by black antenna (flagellum predominantly dark reddish-brown in *H. dagestanica*), last antennal article not tapering towards apex (tapering towards apex with ventral margin slightly concave in *H. dagestanica*), antennal articles 5–12 not modified (with roundish bump or small pointed tubercle near distal end of posterior side in *H. dagestanica*), ferruginous tarsi (brown in *H. dagestanica*), and lateral lobes of bilobed membranous appendage at apical margin of sternum 6 laterally elongated into a rounded tip and medially not separated from each other by an emargination (laterally elongated into a more or less acute tip and separated from each other by a shallow median emargination in *H. dagestanica*).

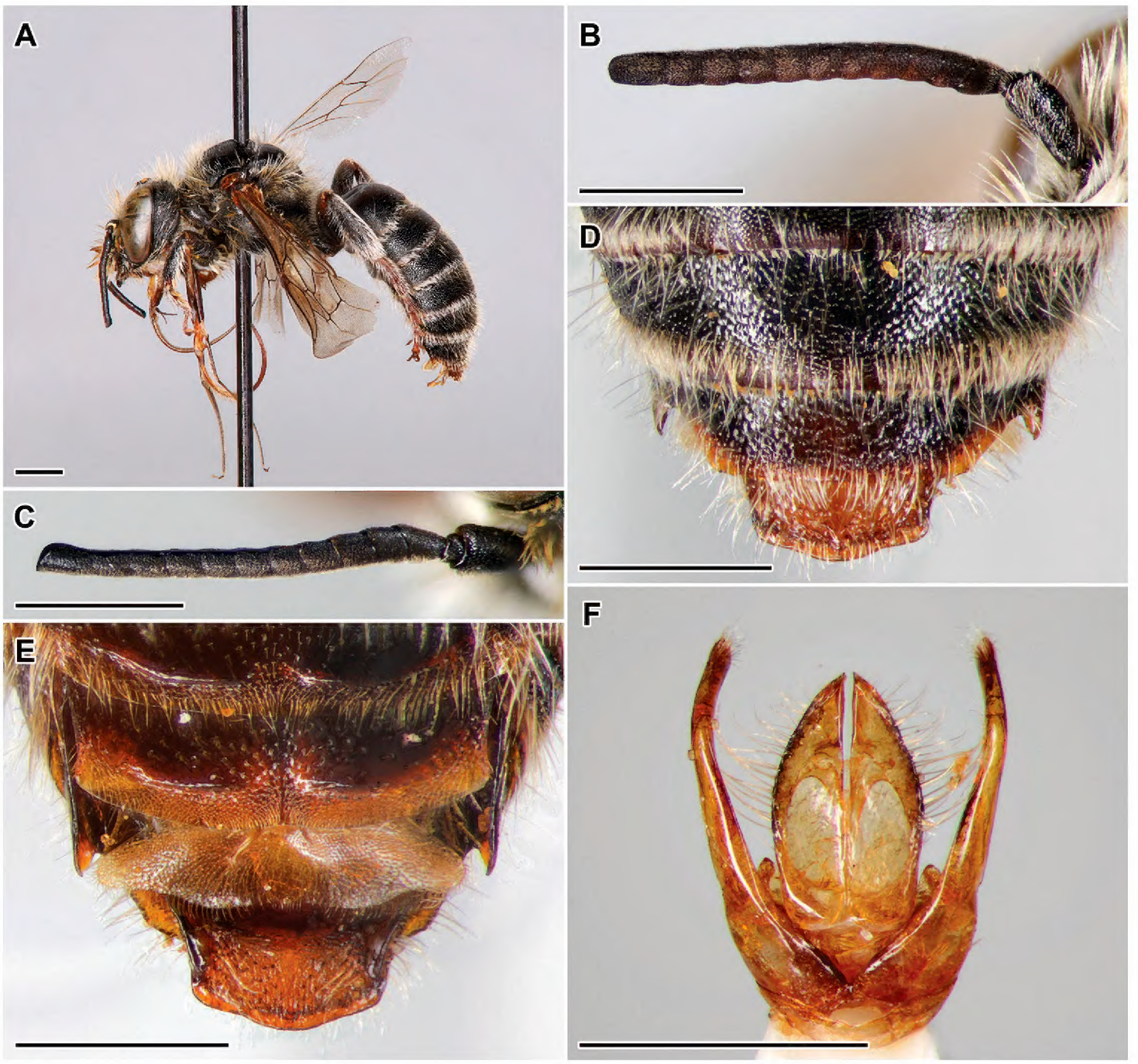

Figure 3. *Hoplitis andreasmuelleri* Fateryga & Proshchalykin, sp. nov., ♂, holotype (**A**) and paratype (**B–F**) **A** habitus in lateral view **B** antenna in front view **C** antenna in dorsal view **D** terga 4–6 in dorsal view **E** sterna 5–6 and tergum 7 in ventral view **F** genitalia in dorsal view. Scale bars 1 mm.

Assignment to species group. Due to the presence of a submarginal carina on female sternum 6 and the apically rounded male tergum 7, *H. andreasmuelleri* is clearly a member of the *H. adunca* species group.

Description. Due to the uniform morphology of the numerous species of *Hoplitis* (*Hoplitis*), the following description is restricted to characters, that are relevant for the recognition of the new species.

Female. Body length 9–10 mm. ***Head*:** Head about 0.9× as long as wide (Fig. 2B). Distance between lateral ocellus and preoccipital margin about 1.6× as long as ocellar diameter. Second segment of labial palpus about 2.3× as long as first segment and about 1.4× as long as compound eye (Fig. 2A). Proboscis reaching coxa of mid leg when folded. Mandible three-toothed, its preapical zone weakly reddish. Clypeus densely punctured with interspaces rarely surpassing the diameter of half a puncture, basally with a small impunctate triangular area continuing to a short and indistinct polished midline (Fig. 2B).

Antennal article 3 almost 1.5× as long as apically wide and about 1.5× as long as article 4. Antenna completely black (Fig. 2B). ***Mesosoma*:** Tegula dark brown except for black anterior third and black inner margin. Scutum and scutellum densely punctured with interspaces rarely surpassing the diameter of one puncture except lateroapically on scutum, where interspaces reach the diameter of one puncture. Basal area of propodeum shagreened throughout. Posterior surface of propodeum shagreened with scattered indistinct punctures. Propodeal pit polished. Tibial spur of fore leg elongated into tip, which is slightly longer than basally wide and angularly stepped from more basal part of spur. Tibial spurs of hind leg yellowish; inner spur slightly tapering towards apex, which is strongly curved at an angle of 30 to 40 degrees (Fig. 2C); outer spur slightly shorter than inner spur, its apex curved at an angle of about 45 degrees. Tarsi of all legs ferruginous except basal black parts on outer sides of basitarsi (Fig. 2A). ***Metasoma*:** Punctation of tergal discs moderately dense with interspaces reaching the diameter of two to four punctures on discs 1–3 (Fig. 2D). Marginal zone of terga 1–5 covered with sparse band of whitish hairs, which may be interrupted medially in worn specimens (Fig. 2D). Tergal discs 1–4 with sparse short erect pilosity of whitish hairs, which are shorter than antennal article 2. When seen from behind, longest erect hairs on median half of tergum 1 only about 1/7 to 1/8 as long as maximal length of lateral hair tuft. Disc of terga 5–6 covered with moderately dense and appressed whitish pilosity (Fig. 2E). Sternum 6 lateroapically with distinct submarginal carina and medioapically with a very short triangular tooth. Scopa whitish.

Male. Body length 9.5–10.5 mm. ***Head*:** Head about 0.8× as long as wide. Distance between lateral ocellus and preoccipital margin about 1.3× as long as ocellar diameter. Second segment of labial palpus about 2.15× as long as first segment and 1.2× as long as compound eye (Fig. 3A). Proboscis reaching coxa of mid leg when folded. Mandible two-toothed and predominantly black, sometimes with dark reddish-brown preapical zone. Clypeus rather strongly convex in profile, its punctation very fine and dense without polished interspaces. Apical margin of clypeus shallowly emarginate and crenulate. Antennal article 1 about 2.2× as long as maximally wide (Fig. 3B). Antennal article 3 about 1.3× as long as apically wide and almost 1.6× as long as article 4; antennal articles 3–4 with ventral margin distinctly widened distally (Fig. 3B). Antennal articles 4–5 as wide as article 3 apically and in dorsal view wider than articles 6–12 (Fig. 3C). Last article of antenna about 1.7× as long as basally wide (Fig. 3B); in dorsal view, its posterior side strongly widened towards apex (Fig. 3C). Antenna black (Fig. 3B, C). ***Mesosoma*:** Tegula brownish-red except for black anterior third and black inner margin. Scutum and scutellum densely punctured with interspaces rarely surpassing the diameter of one puncture except laterally on scutum, where interspaces may reach the diameter of one and a half punctures. Basal area of propodeum shagreened throughout. Posterior surface of propodeum shagreened with scattered punctures. Propodeal pit polished. Tibial spur of fore leg elongated into tip, which is as long as basally wide and angularly stepped from more basal part of spur. Tibial spurs of hind leg yellowish, tapering towards apex and apically curved. Tarsi of all legs ferruginous (Fig. 3A). ***Metasoma*:** Punctation of tergal discs moderately dense with interspaces reaching the diameter of one to three punctures on discs 1–4. Marginal zone of terga 1–5 covered with rather dense band of whitish to yellowish-white hairs (Fig. 3D), which may be interrupted on terga 1–3 in worn specimens. Tergum 6 laterally toothed, its marginal zone reddish,

ciliated with yellowish hairs, apically crenulate and medially very slightly emarginate to straight (Fig. 3D). Apical margin of tergum 7 medially rounded (Fig. 3D). Marginal zone of sterna 2–5 reddish and very densely punctured with interspaces much narrower than the diameter of one puncture (Fig. 3E). Apical margin of sterna 1–4 almost straight and of sternum 5 weakly rounded and medially shallowly emarginate (Fig. 3E). Marginal zone of sterna 2–4 with loose whitish to yellowish hair band (Fig. 3E). Sterna 2–5 with preapical transverse swelling, which is sparsely punctured and medioapically emarginate (Fig. 3E). Sternum 6 basally with pair of membranous flaps. Lobes of bilobed membranous appendage at apical margin of sternum 6 moderately haired, distinctly wider than long, laterally elongated into a distinct rounded tip and medially not separated from each other, forming an entire structure (Fig. 3E). Apical margin of the sclerotised base of sternum 6 with two very narrow and diverging median tufts of few long hairs, which surpass the centre of the membranous appendage of sternum 6. Gonoforceps very narrow, slightly bent inwards and downwards in its apical third and apically with dense and short tuft of yellowish-white hairs (Fig. 3F). Outer margin of penis valve ciliated with yellowish-white bristles, of which the longest are one and a half times longer than the maximal valve width (Fig. 3F).

Material examined. ***Holotype*:** Russia. • Dagestan: vicinity of Kurush, 41°15'59"N, 47°49'33"E, 26.VI.2023, ♂, leg. A. Fateryga [ZISP]. ***Paratypes*:** Russia. • Dagestan: vicinity of Kurush, 41°15'59"N, 47°49'33"E, 26.VI.2023, 1 ♀, on *Vicia alpestris*, leg. A. Fateryga [ZISP]; • ibid., 26.VI.2023, 3 ♂, leg. A. Fateryga [CAFK, ETHZ, FSCV]; ibid., 26.VI.2023, 3 ♀, leg. M. Proshchalykin [CAFK, ETHZ, FSCV].

Etymology. It is a pleasure to name this species after our colleague Andreas Müller (Zurich, Switzerland), the leading expert on osmiine bees.

Distribution. Russia: European part (North Caucasus). The species is currently known only from the type locality in Dagestan.

Remarks. The species was collected in Samurskiy National Park, on alpine meadow slopes of the Chekhychay River valley (Samur River basin) below the village of Kurush (Dokuzparinskiy District of the Republic of Dagestan), about 2330 m a.s.l. (Fig. 4A). One female was collected visiting flowers of *Vicia alpestris* Steven

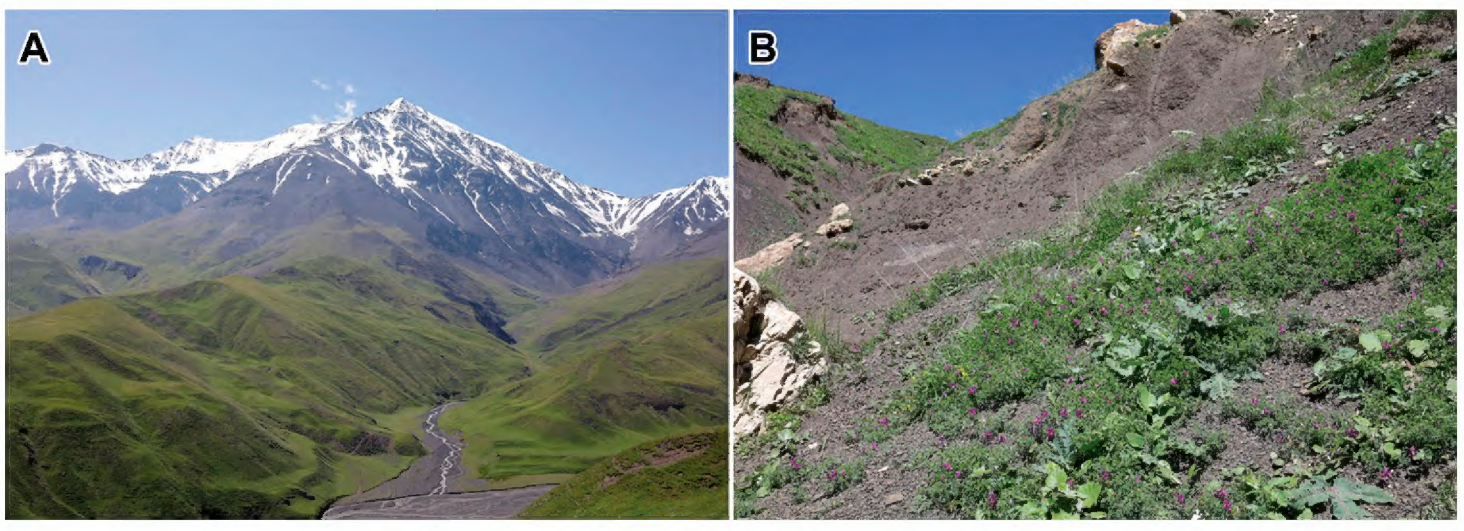

Figure 4. Habitat of *Hoplitis andreasmuelleri* Fateryga & Proshchalykin, sp. nov. in Chekhychay River valley, Samurskiy National Park, Dagestan **A** overview **B** slope with flowering *Vicia alpestris* Steven.

(Fig. 4B), while three other females were collected by sweeping patches of another species, *Vicia sosnowskyi* Ekutim. (Fabaceae). Males were collected on the ground between patches of both plant species. These data suggest a preference for the genus *Vicia* L. by *H. andreasmuelleri*, perhaps representing narrow oligolecty on a single plant genus (Müller and Kuhlmann 2008). However, more flower visitation data including microscopical analysis of pollen contained in the female scopae are needed to clarify the species' degree of host plant specialization, although many members of the *H. adunca* species group exclusively or predominantly exploit Fabaceae for pollen (Müller 2016, 2024; Sedivy et al. 2012b).

Hoplitis (*Kumobia*) *abbreviata* (Morawitz, 1875)

Fig. 5

Osmia abbreviata Morawitz, 1875: 96, ♀ (type locality: "Prope Syr-darjam" [Central Asia]), holotype, ♀, type depository not indicated, probably Zoological Museum of the M.V. Lomonosov Moscow State University, Moscow, Russia.

Material examined (new record). Russia. • Altai Republic: "Mars", 50°03'50"N, 88°18'45"E, 25.VI.2022, 1 ♀, leg. M. Proshchalykin [CAFK].

Distribution. Russia: Western Siberia (*Altai Republic). – Kyrgyzstan, Kazakhstan, Mongolia.

Remarks. The species was collected in a mountain semi-desert with sparse shrubs of *Caragana bungei* Ledeb. (Fabaceae) (Fig. 5A) at an elevation of about 1800 m a.s.l.

Conclusions

A total of 39 species of *Hoplitis* is known from Russia to date (Table 1). Among them, *H. daurica* (Radoszkowski, 1887), *H. dagestanica*, and *H. andreasmuelleri* are known only from Russia. Most other species are distributed from the Mediterranean to the Middle East and the Caucasus or to Central Asia; some species have broad distribution in the whole Palaearctic or even Holarctic (*H. robusta* (Nylander, 1848)) region, and some species are restricted to the eastern part of Central Asia and the Far East. One species (*H. scita* (Eversmann, 1852)) has a remarkably disjunctive distribution in the Caucasus and eastern Central Asia to the Far East (despite bee sampling efforts in other regions of Central Asia in the Soviet period). There are also several Caucasian sub-endemics and possibly a narrow endemic (*H. caucasicola* Müller, 2012). The most species-rich part of Russia in a large scale is the European part where 33 species of *Hoplitis* occur and 19 of them occur in Russia only there. Of them, 23 species occur in the North Caucasus (11 only there), which is the most species-reach region in a smaller scale. There are 12 species in the Urals, 12 species in Western Siberia, 13 species in Eastern Siberia and only five species in the Far East (Table 1).

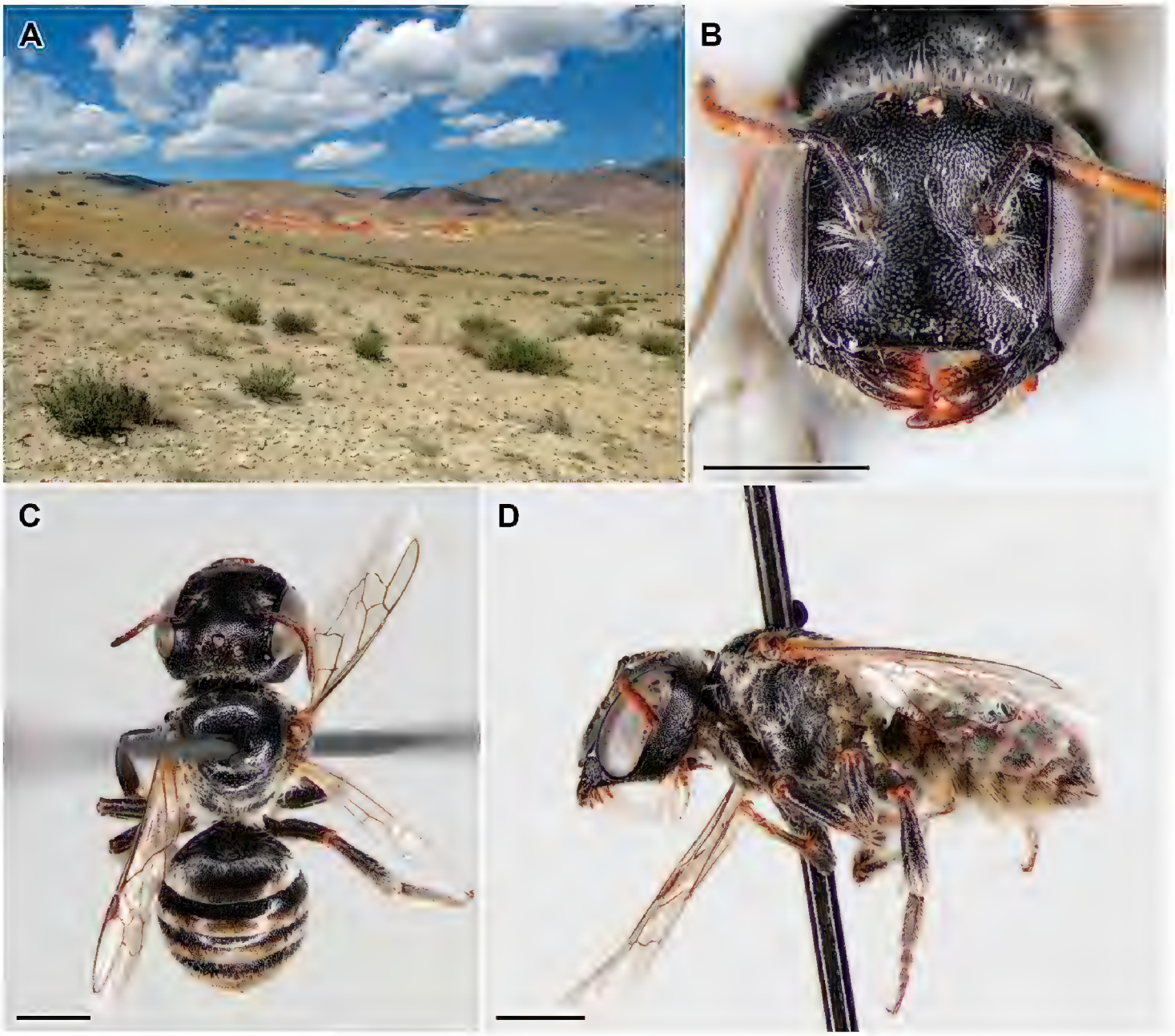

Figure 5. *Hoplitis abbreviata* (Morawitz, 1875) in the Altai Republic **A** habitat in the Mars Place, Kosh-Agach District **B** head in front view **C** habitus in dorsal view **D** habitus in lateral view. Scale bars 1 mm.

Table 1. Updated distributional list of the species of *Hoplitis* from Russia.

Species	Distribution in Russia	Distribution outside Russia
Hoplitis (*Alcidamea*) *acuticornis* (Dufour & Perris, 1840)	European part (East, North Caucasus, Crimea), Urals, Western Siberia (Omsk Province, Tomsk Province, Novosibirsk Province, Kemerovo Province, Altai Territory), Eastern Siberia (Krasnoyarsk Territory)	Western, Southern, and Eastern Europe, Armenia, Azerbaijan, Turkey, Cyprus, Syria, Jordan, Lebanon, Israel, Iran, Turkmenistan, Tajikistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Alcidamea*) *beijingensis* Wu, 1987	Eastern Siberia (Buryatia)	China
Hoplitis (*Alcidamea*) *campanularis* (Morawitz, 1877)	European part (North Caucasus)	Southern and Eastern Europe, Northern Africa, Georgia, Turkey, Lebanon, Israel
Hoplitis (*Alcidamea*) *caucasica* (Friese, 1920)	European part (North Caucasus)	Azerbaijan, Turkey
Hoplitis (*Alcidamea*) *claviventris* (Thomson, 1872)	European part (Central, North Caucasus, Crimea), Urals, Western Siberia (Omsk Province, Novosibirsk Province, Kemerovo Province, Altai Territory, Altai Republic), Eastern Siberia (Khakassia, Tyva, Buryatia)	Western, Northern, Southern, and Eastern Europe, Kazakhstan, Mongolia, China
Hoplitis (*Alcidamea*) *curvipes* (Morawitz, 1871)	European part (North Caucasus)	Western, Southern, and Eastern Europe, Azerbaijan, Turkey, Syria, Iran
Hoplitis (*Alcidamea*) *fulva* (Eversmann, 1852)	European part (East, South, Crimea), Urals	Eastern Europe, Armenia, Azerbaijan, Turkey, Syria, Jordan, Kazakhstan, Mongolia, China

Species	Distribution in Russia	Distribution outside Russia
Hoplitis (*Alcidamea*) *leucomelana* (Kirby, 1802)	European part (North, Central, East, South, North Caucasus, Crimea), Urals, Western Siberia (Omsk Province, Tomsk Province, Novosibirsk Province, Kemerovo Province, Altai Territory, Altai Republic), Eastern Siberia (Khakassia, Tyva, Krasnoyarsk Territory, Irkutsk Province, Buryatia, Yakutia, Zabaikalskiy Territory), Far East (Amurskaya Province, Khabarovsk Territory, Primorskiy Territory)	Western, Northern, Southern, and Eastern Europe, Northern Africa, Georgia, Armenia, Azerbaijan, Turkey, Iran, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia, China
Hoplitis (*Alcidamea*) *mitis* (Nylander, 1852)	European part (Crimea), Urals, Western Siberia (Kemerovo Province, Altai Republic), Eastern Siberia (Khakassia, Krasnoyarsk Territory, Yakutia)	Western, Southern, and Eastern Europe, Armenia, Kazakhstan, Mongolia
Hoplitis (*Alcidamea*) *mollis* Tkalců, 2000	European part (South, Crimea)	Eastern Europe, Azerbaijan, Turkey, Syria, Jordan, Uzbekistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Alcidamea*) *ozbeki* Tkalců, 2000	European part (North Caucasus)	Georgia, Turkey
Hoplitis (*Alcidamea*) *praestans* (Morawitz, 1893)	European part (South, North Caucasus, Crimea)	Western, Southern, and Eastern Europe, Northern Africa, Turkey, Syria, Jordan, Lebanon, Israel, Iran, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Alcidamea*) *princeps* (Morawitz, 1872)	European part (South, Crimea), Urals, Western Siberia (Altai Republic), Eastern Siberia (Tyva, Irkutsk Province, Buryatia, Zabaikalskiy Territory)	Eastern Europe, Kazakhstan, Mongolia, China
Hoplitis (*Alcidamea*) *scita* (Eversmann, 1852)	European part (North Caucasus), Western Siberia (Altai Republic), Eastern Siberia (Khakassia, Tyva, Irkutsk Province, Buryatia), Far East (Amurskaya Province, Khabarovsk Territory, Primorskiy Territory)	Kyrgyzstan, Mongolia, China
Hoplitis (*Alcidamea*) *tridentata* (Dufour & Perris, 1840)	European part (Central, East, South, North Caucasus, Crimea), Urals, Western Siberia (Omsk Province, Tomsk Province, Novosibirsk Province, Kemerovo Province, Altai Territory, Altai Republic)	Western, Southern, and Eastern Europe, Northern Africa, Georgia, Armenia, Azerbaijan, Turkey, Syria, Israel, Iran, Uzbekistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Alcidamea*) *tuberculata* (Nylander, 1848)	European part (North, Central, East), Urals, Western Siberia (Tyumen Province, Omsk Province, Tomsk Province, Novosibirsk Province, Kemerovo Province, Altai Republic), Eastern Siberia (Khakassia, Tyva, Irkutsk Province, Buryatia, Yakutia, Zabaikalskiy Territory), Far East (Amurskaya Province, Khabarovsk Territory, Magadan Province)	Western, Northern, Southern, and Eastern Europe, Mongolia, China
Hoplitis (*Anthocopa*) *caucasicola* Müller, 2012	European part (North Caucasus)	Georgia
Hoplitis (*Anthocopa*) *daurica* (Radoszkowski, 1887)	Eastern Siberia (Tyva, Buryatia)	–
Hoplitis (*Anthocopa*) *jakovlevi* (Radoszkowski, 1874)	European part (South, North Caucasus, Crimea), Urals	Western and Southern Europe, Northern Africa, Armenia, Azerbaijan, Turkey, Iran, Turkmenistan, Tajikistan, Kyrgyzstan, Kazakhstan, China
Hoplitis (*Anthocopa*) *mocsaryi* (Friese, 1895)	European part (Central, North Caucasus, Crimea)	Western, Southern, and Eastern Europe, Turkey, Israel, Iran
Hoplitis (*Anthocopa*) *papaveris* (Latreille, 1799)	European part (Central, North Caucasus), Urals	Western, Southern, and Eastern Europe, Turkey, Kazakhstan, China
Hoplitis (*Anthocopa*) *perezi* (Ferton, 1894)	European part (South, North Caucasus, Crimea)	Western, Southern, and Eastern Europe, Northern Africa, Armenia, Azerbaijan, Turkey, Israel, Iran, Afghanistan, Turkmenistan, Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Anthocopa*) *saxialis* (van der Zanden, 1994)	European part (North Caucasus)	Southern Europe, Turkey, Iran
Hoplitis (*Anthocopa*) *villosa* (Schenck, 1853)	?European part	Western, Southern, and Eastern Europe
Hoplitis (*Formicapis*) *maritima* (Romankova, 1985)	Eastern Siberia (Buryatia), Far East (Primorskiy Territory)	Mongolia

Species	Distribution in Russia	Distribution outside Russia
Hoplitis (*Formicapis*) *robusta* (Nylander, 1848)	European part (Central), Western Siberia (Tomsk Province, Altai Republic), Eastern Siberia (Irkutsk Province, Buryatia, Yakutia, Zabaikalskiy Territory), Far East (Amurskaya Province, Magadan Province, Chukotka Autonomous Area)	Western, Northern, Southern, and Eastern Europe, Mongolia, China, North America
Hoplitis (*Hoplitis*) *adunca* (Panzer, 1798)	European part (Central, South, North Caucasus), Urals	Western, Northern, Southern, and Eastern Europe, Northern Africa, Georgia, Armenia, Azerbaijan, Turkey, Turkmenistan, Kyrgyzstan, Kazakhstan
Hoplitis (*Hoplitis*) *andreasmuelleri* Fateryga & Proshchalykin, **sp. nov.**	European part (North Caucasus)	–
Hoplitis (*Hoplitis*) *anthocopoides* (Schenck, 1853)	European part (South, North Caucasus, Crimea)	Western, Northern, Southern, and Eastern Europe, Northern Africa, Armenia, North America (introduced)
Hoplitis (*Hoplitis*) *astragali* Fateryga, Müller & Proshchalykin, 2023	European part (North Caucasus)	Azerbaijan, Turkmenistan
Hoplitis (*Hoplitis*) *carinata* (Stanek, 1969)	European part (Crimea)	Southern and Eastern Europe, Armenia, Azerbaijan, Turkey, Syria, Jordan, Iran
Hoplitis (*Hoplitis*) *dagestanica* Fateryga, Müller & Proshchalykin, 2023	European part (North Caucasus)	–
Hoplitis (*Hoplitis*) *kaszabi* Tkalců, 2000	Western Siberia (Altai Republic), Eastern Siberia (Buryatia)	Tajikistan, Kazakhstan, Mongolia, China
Hoplitis (*Hoplitis*) *linguaria* (Morawitz, 1875)	European part (North Caucasus)	Georgia, Turkey
Hoplitis (*Hoplitis*) *manicata* Morice, 1901	European part (South, North Caucasus, Crimea)	Western, Southern, and Eastern Europe, ?Northern Africa, Armenia, Azerbaijan, Turkey
Hoplitis (*Kumobia*) *abbreviata* (Morawitz, 1875)	Western Siberia (Altai Republic)	Kyrgyzstan, Kazakhstan, Mongolia
Hoplitis (*Pentadentosmia*) *laevifrons* (Morawitz, 1872)	?European part, Urals	Western, Southern, and Eastern Europe, Armenia, Azerbaijan, Turkey, Pakistan, India
Hoplitis (*Pentadentosmia*) *tringa* (Warncke, 1991)	European part (North Caucasus)	Azerbaijan, Turkey, Iran
Hoplitis (*Platosmia*) *inconspicua* Tkalců, 1995	Western Siberia (Altai Republic), Eastern Siberia (Khakassia, Tyva)	Mongolia

Acknowledgements

We thank Ramazan Murtazaliev (Caspian Institute of Biological Resources of the Dagestan Federal Research Center of RAS, Makhachkala, Russia) for organizing our visit to the Samurskiy National Park, where the specimens of *H. andreasmuelleri* were collected. We thank also Andreas Müller (ETH Zurich, Institute of Agricultural Sciences, Biocommunication and Entomology, Zurich, Switzerland), who confirmed that this species is indeed new and recommended to describe it. Two anonymous reviewers provided some suggestions to improve the text.

This work was supported by the Ministry of Science and Higher Education of the Russian Federation in accordance with agreement No. 075-15-2022-322, date 22 April 2022, on providing a grant in the form of subsidies from the Federal budget of the Russian Federation. The grant was provided for state support for the creation and development of a World-class Scientific Center "Agrotechnologies for the Future".

References

Aubert M, Müller A, Praz CJ (2024) A new osmiine bee with a spectacular geographic disjunction: *Hoplitis* (*Hoplitis*) *onosmaevae* sp. nov. (Hymenoptera, Anthophila, Megachilidae). Alpine Entomology 8: 65–79. https://doi.org/10.3897/alpento.8.118039

Benoist R (1931) Les osmies de la faune française [Hymenopt. Apidae]. Annales de la Société Entomologique de France 100: 23–60. https://doi.org/10.1080/21686351.1931.12280120

Byvaltsev AM, Proshchalykin MYu (2019) Megachilid bees (Hymenoptera: Megachilidae) of Siberia: corrections and additions to the catalogue of the Hymenoptera of Russia. In: A.I. Kurentsov's Annual Memorial Meetings, 30: 163–171. [In Russian] https://doi.org/10.25221/kurentzov.30.14

Ducke A (1899) Neue Arten und Varietäten der Gattung *Osmia* Panz. Entomologische Nachrichten 25: 211–215. https://doi.org/10.1002/mmnd.48018990149

Ducke A (1900) Die Bienengattung *Osmia* Panz. als Ergänzung zu Schmiedeknecht's "Apidae europaeae" Vol. II in ihren palaearctischen Arten monographisch bearbeitet. Berichte des Naturwissenschaftlichen-Medizinischen Vereins Innsbruck 25: 1–323.

Eversmann E (1852) Fauna hymenopterologica volgo-uralensis (continuatio). Bulletin de la Société Impériale des Naturalistes de Moscou 25(3): 1–137.

Fateryga AV (2009) The observations on the nesting behavior of the solitary wasp *Tropidodynerus interruptus* (Brullé, 1832) (Hymenoptera, Vespidae, Eumeninae) in Crimea. Euroasian Entomological Journal 8(4): 381–385. [+ 380 + VI] [In Russian]

Fateryga AV (2018) Nesting biology of *Paragymnomerus signaticollis tauricus* (Kostylev, 1940) (Hymenoptera: Vespidae: Eumeninae). Zootaxa 4378(3): 429–441. https://doi.org/10.11646/zootaxa.4378.3.10

Fateryga AV, Ivanov SP (2023) Corrections and additions to the list of the megachilid bees (Hymenoptera: Megachilidae) of the Crimean Peninsula. Ekosistemy 36: 56–65. https://doi.org/10.5281/zenodo.10370922

Fateryga AV, Ivanov SP, Filatov MA (2018) Megachilid-bees (Hymenoptera: Megachilidae) of the Crimean Peninsula. Entomofauna 39: 235–283.

Fateryga AV, Müller A, Proshchalykin MYu (2023) Two new *Hoplitis* species of the subgenus *Hoplitis* Klug, 1807 (Hymenoptera, Megachilidae) and the nesting biology of *H. astragali* sp. nov. in Dagestan. Journal of Hymenoptera Research 96: 641–656. https://doi.org/10.3897/jhr.96.109255

Fateryga AV, Proshchalykin MYu (2020) New records of megachilid bees (Hymenoptera: Megachilidae) from the North Caucasus and the South of European Russia. Caucasian Entomological Bulletin 16(2): 225–231. https://doi.org/10.23885/181433262020162-225331

Fateryga AV, Proshchalykin MYu (2024) 150 years after Ferdinand Morawitz: a survey of megachilid bees (Hymenoptera, Megachilidae) of Dagestan, Russia. ZooKeys 1217: 101–117. https://doi.org/10.3897/zookeys.1217.134704

Fateryga AV, Proshchalykin MYu, Astafurova YuV, Popov IB (2019) [2018] New records of megachilid bees (Hymenoptera, Megachilidae) from the North Caucasus and neighboring regions of Russia. Entomological Review 98(9): 1165–1174. https://doi.org/10.1134/S0013873818090026

Ferton C (1894) Seconde note sur les moeurs de quelques Hyménoptères du genre *Osmia* Panzer principalement de la Provence. Actes de la Société Linnéenne de Bordeaux 47: 203–214 [+ pl. VI].

Ferton C (1895) Nouvelles observations sur l'instinct des Hyménoptères gastrilégides de la Provence. Actes de la Société Linnéenne de Bordeaux 48: 241–249.

Ferton C (1897) Nouvelles observations sur l'instinct des Hyménoptères gastrilégides de France et de Corse. Actes de la Société Linnéenne de Bordeaux 52: 37–50.

Ferton C (1901) Notes détachées sur l'instinct des Hyménoptères mellifères et ravisseurs avec la description de quelques espèces. Annales de la Société Entomologique de France 70: 83–148. [+ pls 1–3] https://doi.org/10.1080/21686351.1901.12279320

Levchenko TV (2020) Contributions to the fauna of bees (Hymenoptera: Apoidea) of Moscow Province. 8. Family Megachilidae. Eversmannia 64: 52–84. [In Russian]

Levchenko TV (2023) *Hoplitis* (*Anthocopa*) *mocsaryi* (Friese, 1895) – a new for Middle Russia species of megachilid bees (Hymenoptera: Megachilidae) from the Kulikovo Field. In: Burova OV, Volkova EM, Shvets OV (Eds) Problems of study and recovering of landscapes of forest-steppe zone: historical-cultural and nature territories. Issue 5. Kulikovo Pole State Museum-Reserve & Russian Geographical Society, Tula, 74–79. [In Russian]

Michener CD (2007) The bees of the world (2nd edn). Johns Hopkins University Press, Baltimore, [xvi +] 953 pp. [+ 20 pls]

Morawitz F (1872) Neue suedrussische Bienen. Horae Societatis Entomologicae Rossicae 9(1): 45–62.

Morawitz F (1875) A travel to Turkestan by the member-founder of the society A.P. Fedtschenko accomplished from the Imperial Society of Naturalists, Anthropologists, and Etnographists on a Commission from the General-Governor of Turkestan K.P. von Kaufmann. Issue 9. Volume 2. Zoogeographical investigations. Part 5. Division 7. Bees (Mellifera). Proceedings of the Imperial Society of Devotees of Natural History, Anthropology and Ethnography 19(2): [i–ii +] 1–160. [In Russian and Latin]

Müller A (2016) *Hoplitis* (*Hoplitis*) *galichicae* spec. nov., a new osmiine bee species from Macedonia with key to the European representatives of the *Hoplitis adunca* species group (Megachilidae, Osmiini). Zootaxa 4111(2): 167–176. https://doi.org/10.11646/zootaxa.4111.2.5

Müller A (2024) Palaearctic Osmiine Bees, ETH Zürich. http://blogs.ethz.ch/osmiini [accessed 15 October 2024]

Müller A, Kuhlmann M (2008) Pollen hosts of western palaearctic bees of the genus *Colletes* (Hymenoptera: Colletidae): the Asteraceae paradox. Biological Journal of the Linnean Society 95(4): 719–733. https://doi.org/10.1111/j.1095-8312.2008.01113.x

Praz CJ, Müller A, Danforth BN, Griswold TL, Widmer A, Dorn S (2008) Phylogeny and biogeography of bees of the tribe Osmiini (Hymenoptera: Megachilidae). Molecular Phylogenetics and Evolution 49(1): 185–197. https://doi.org/10.1016/j.ympev.2008.07.005

Proshchalykin MYu, Astafurova YuV, Osytshnjuk AZ (2017) The species-group names of bees (Hymenoptera: Apoidea, Apiformes) described from Crimea, North Caucasus, European part of Russia and Ural. Part II. Families Andrenidae and Megachilidae. Far Eastern Entomologist 328: 1–34.

Proshchalykin MYu, Fateryga AV (2017) Family Megachilidae. In: Lelej AS, Proshchalykin MYu, Loktionov VM (Eds) Annotated catalogue of the Hymenoptera of Russia. Volume 1. Symphyta and Apocrita: Aculeata. Proceedings of the Zoological Institute RAS, Supplement 6: 295–308. https://doi.org/10.31610/trudyzin/2017.supl.6.5

Proshchalykin MYu, Fateryga AV, Astafurova YuV (2023) Corrections and additions to the catalogue of the bees (Hymenoptera, Anthophila) of Russia. ZooKeys 1187: 301–339. https://doi.org/10.3897/zookeys.1187.113240

Proshchalykin MYu, Müller A (2019) Additional records of osmiine bees (Hymenoptera: Megachilidae: Osmiini) from Siberia. Zootaxa 4563(1): 163–174. https://doi.org/10.11646/zootaxa.4563.1.9

Sedivy C, Dorn S, Müller A (2012a) Molecular phylogeny of the bee genus *Hoplitis* (Megachilidae: Osmiini) – how does nesting biology affect biogeography? Zoological Journal of the Linnean Society 167(1): 28–42. https://doi.org/10.1111/j.1096-3642.2012.00876.x

Sedivy C, Dorn S, Widmer A, Müller A (2012b) Host range evolution in a selected group of osmiine bees (Hymenoptera: Megachilidae): the Boraginaceae-Fabaceae paradox. Biological Journal of the Linnean Society 108(1): 35–54. https://doi.org/10.1111/j.1095-8312.2012.02013.x

Tkalců B (1969) Beiträge zur Kenntnis der Fauna Afghanistans (Sammelergebnisse von O. Jakeš 1963–64, D. Povolný 1965, D. Povolný & Fr. Tenora 1966, J. Šimek 1965–66, D. Povolný, J. Gaisler, Z. Šebek & Fr. Tenora 1967). Osmiini, Megachilidae, Apoidea, Hym. Acta Musei Moraviae. Scientiae Naturales (Supplementum) 54: 327–346. [Not seen]

Ungricht S, Müller A, Dorn S (2008) A taxonomic catalogue of the Palaearctic bees of the tribe Osmiini (Hymenoptera: Apoidea: Megachilidae). Zootaxa 1865: 1–253. https://doi.org/10.11646/zootaxa.1865.1.1